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Anocca: Standardizing TCR cell therapy design

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Anocca is using engineered human cells to recapitulate the T cell immune system ex vivo, eliminating the person-to-person variability in working with primary T cells from patients, to create standardized, scalable TCR-modified T cell therapies.

Anocca AB CEO Reagan Jarvis, a biochemist and the Swedish company's scientific founder, was working on T cells when he became frustrated at the lack of methods for finding and characterizing TCRs or identifying HLA-restricted antigens.

Primary T cells are not ideal for assay creation, he told BioCentury. "The donor-to-donor variability, sensitivity and specificity of those assays is extremely undesirable."

"That frustration led to a concept on paper of how to make a standardized, scalable way of doing very high-precision analysis of TCR targets and the receptors themselves," Jarvis said.

He pitched the idea to co-founder Mikael Blomqvist in 2013 when T cell therapies were gaining momentum in the clinic. Blomqvist, who had built software and manufacturing companies in the past, backed the company via his Michano AB firm with $30 million in seed funding in 2014. It was the first venture into biotech for Blomqvist, who is a member of the company's board.

Anocca's approach involves removing HLAs and TCRs from human cell lines to create "blank" receiver cells, into which the company can rapidly insert its own HLAs and TCRs, informed by patient tumor genetic information, to create engineered antigen-presenting and TCR-presenting cells, respectively.

The company then puts the engineered cells to work in a variety of assays including target discovery, TCR validation, safety characterization and manufacturing quality control. "What we've done is basically standardize those cell-based assays," said Jarvis.

Anocca is starting with autologous TCR cell therapies, but its long-term vision is to develop allogeneic medicines.

For target discovery, the company sequences tumor cells from individual patients, identifies a patient's six HLA proteins and makes engineered antigen presenting cells (APCs) that separately express each of the HLA genes.

The mutated cancer gene sequences are then inserted into the engineered APCs, after which the cells are lysed and the HLA:antigen complexes analyzed to identify HLA-presented neoantigens.

Anocca then exposes donor T cells to an engineered APC expressing the identified neoantigen to find TCRs that interact with the antigen. To create an autologous cell therapy, the company inserts the TCRs into patient T cells, thereby reprogramming the cells to attack the tumor.

Anocca is making therapies against multiple antigen classes, including "shared" antigens found in many patients, neoantigens specific to individuals, and antigens from viruses that cause cancer.

Jarvis says the company has built a lot of the necessary preclinical testing into its platform, such as TCR safety benchmarks. Mice can't be used for toxicity studies because mouse HLAs are different from human HLAs. The company is using animal models in some cases to investigate efficacy, and will start to publish studies next year.

Anocca's disclosed 15-product pipeline aims to treat both hematological malignancies and solid tumors expressing a range of targets and HLA allotypes.

Since its seed round, the company raised $30 million in series A funding in 2019 and $47 million in series B funding in July. The B round was the second largest ever for a Swedish biotech, according to BioCentury's BCIQ database. Anocca will primarily use the funds to advance its lead assets, which it manufactures in house, to the clinic.

Jarvis said Anocca has a research collaboration with the Janssen Research & Development LLC unit of Johnson & Johnson (NYSE:JNJ), although details are undisclosed. Anocca also is in discussions with other companies around discovery, co-development and out-licensing deals, he said.

The biotech had been operating under the radar until it raised its series B because it has a fairly large patent estate that it did not want to call attention to.

"We had no reason to go out and advertise that," said Jarvis. "We were happy with our technology position, had a good base of committed investors and a very clear business plan."

Jarvis declined to compare or contrast Anocca to competitors, but at least seven other companies have disclosed that they are developing neoantigen-targeted cell therapies, including Pact Pharma Inc.

Pact's platform uses bioinformatic analyses of patients' tumor and normal DNA and RNA to identify candidate neoantigens that could drive antitumor T cell responses. The neoantigen peptides are synthesized and presented on HLA molecules coating the surfaces of magnetic beads used to isolate neoantigen-specific CD8+ T cells from patient blood; those cells' TCRs are then engineered into autologous CD4+ and CD8+ T cells that get re-infused back into patients.

BioNTech SE (NASDAQ:BNTX) added to its series of TCR, neoantigen deals when it acquired a solid tumor neoantigen T cell receptor platform from the Kite Pharma Inc. unit of Gilead Sciences Inc. (NASDAQ:GILD) in July.

The deal reflects a broader shift by next-generation neoantigen companies towards cell therapies, following an initial focus on cancer vaccines.

COMPANY PROFILE
Anocca AB

Södertälje, Sweden

Technology: Scalable and industrialized analytical cell biology platform enabling deep understanding of disease specific T cell biology to deliver highly targeted cell-based therapies

Origin of technology: In-house

Disease focus: Cancer, infectious

Clinical status: Preclinical

Founded: 2014 by Reagan Jarvis and Mikael Blomqvist

Academic collaborators: Karolinska Institute, Karolinska University Hospital

Corporate partners: Janssen

Number of employees: 70

Funds raised: About $100 million

Investors: Swedbank Robur Ny Teknik, Ramsbury Invest, Mellby Gård, Nidoco and Michano

CEO: Reagan Jarvis

Patents: Undisclosed

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